

October 2010, Issue 22

Dear Soft Matter Colleagues,

Welcome to the October 2010 Newsletter. This month one of our members has contributed a series of liquid crystal images to be featured in the Gallery as well as an article on X-ray imaging. If you are an avid reader of the Newsletter we would like to encourage submissions as a great way to help the website grow and most importantly to have your work featured!

The Osuji Lab at Yale University

osuji.lab featuring the Osuji Lab

This month we are which is part of the Department of Chemical

Engineering at Yale University. Prof. Chinedum Osuji is the groups Principal Investigator. Through studies focused on interfacial phenomena, directed self-assembly, rheology and microfluidics, the group investigates basic structure-property re-

lationships of colloids, liquid crystals, surfactants, polymers and biological materials. Among some of the techniques used are microscopy (optical, electron, atomic force), scattering (visible light, x-ray), rheology and other methods, along with some basic polymer and small molecule synthesis.

Some of their most current research highlights include:

· Self-assembled polymer nanocomposites for solar cells: Controlled assembly of organic soft materials and inorganic hard materials is being utilized to create new high efficiency photovoltaic devices as well as proton and ion conduction membranes.

 Microfluidic mimics of vascular structures for model studies of red blood cell mechanics: This study attempts to utilize microfluidic parking devices to capture single giant unilamellar vesicles,

which can then be individually analyzed while subjected to osmotic stresses.

· Elucidation of shear thickening and aging behavior in particulate suspensions and gels. The image to the right shows highly anisotropic vorticity aligned flocs of carbon black particles over

> time. The log-like structures form in a transient response to low shear rate deformation of shear thickened dispersions. Visit the website to see a flash version of



these images.

The website contains a thorough breakdown of the group's current research projects and high quality flash animations and videos of some of the topics mentioned in this article. Visit the Osuji Lab website to read more. You can read one of the groups most recent publications, "Stimuli-Responsive Smart Gels Realized via Modular Protein Design", on page 2.

<www.eng.yale.edu/polymers/index.html>

¹Center Image: Block copolymer thin film membrane for selective species transport.



Stimuli-Responsive Smart Gels Realized via Modular Protein Design

Tijana Z. Grove, Chinedum O. Osuji, Jason D. Forster, Eric R. Dufresne, Lynne Regan. J. Am. Chem. Soc., Sep 2010 (web), DOI: 10.1021/ja106619w

In this paper Chinedum Osuji and colleagues present a modular, bottom-up approach that permits the creation of protein-based smart gels with encoded morphology, functionality, and responsiveness to external stimuli. The properties of these gels are encoded by the proteins from which they are synthesized. Visit JACS publishing to read more.

Exploring soft matter with x-rays

Giuliano Zanchetta and Roberto Cerbino. J. Phys.: Condens. Matter 22 (2010) 323102 (21pp)

X-rays have long been a precious tool for the study of the structure of matter. Their short wavelength makes them ideal for investigating materials down to the atomic scale, while their high penetration power allows for the exploration of opaque samples. In this review, Giuliano Zanchetta and Roberto Cerbino from the University of Milan give an overview of the x-ray techniques suited for the characterization of soft mat-



ter and of their application to systems of current interest. They describe the advantages and limitations of existing x-ray methods and outline the possible developments following the introduction of a new kind of coherent source: the x-ray free electron laser. Visit IOP science to read more.

X-ray diffraction patterns of the A- and Bform of DNA. The A-form has a more clear crystalline signature, whereas the B-form is less sharp because of lateral disorder in the specimen

Self Winding of Helices in Plant Tendrils and Celllulose Liquid Crystal Fibers

M.H.Godinho, J.P.Canejoa, G.Feioa, E.M.Terentjev. Soft Matter, 2010, Advance Article. DOI:10.1039/C0SM00427H.



Passiflora edulis tendrils and cellulosic fibers form helices and spirals. Note the helix reversals – "perversions" – indicated by arrows in (A) and (C). Tendrils and fibers, if supported at both ends, twist into a helix of one handedness over half of its length and of the opposite handedness over the other half, the two halves being connected by a perversion. If supported at just one end, they curl into spirals (B) and (D). Passiflora edulis, like other climbing plants, possesses long, tender, soft, curly and flexible organs called tendrils which allow the plant to find support. Tendrils curl into spirals or twist into a helix, often of one handedness over half of its length and of the opposite handedness over the other half.

The authors report on liquid crystalline cellulosic fibers and jets, which mimic the shapes of helical tendril structures and the subtle physical mechanisms responsible for self-winding behavior as a result of the intrinsic curvature due to the non-uniform deformation of filaments. Read more at RSC Publishing.



32nd Australasian Polymer Symposium

The 32nd Australasian Polymer Symposium (32APS) organized by the Royal Australian Chemical Institute (RACI) Polymer Division will be held from the 13 to 16 February, 2011 at the Novotel Pacific Bay Resort in Coffs Harbour.

The Australasian Polymer Symposium is a feast of polymer science covering all topics ranging from polymer synthesis, characterization, physics of



polymers, engineering to materials. Topics will span from fundamental polymer science such as modeling to applied materials.

A considerable portion of the APS is always dedicated to the interface of polymer science with other disciplines such as biomaterials, nanomaterials and surface science. Earlybird registration is open until October 15, 2010.

The topics of the conference will capture all areas in polymer science:

- Latest developments in polymer synthesis
- Latest trends in polymer characterization
- Advanced Materials
- Polymers for Health
- Polymers and the Environment and Water Treatment
- Polymers for Electronics and Energy

<www.32aps.org.au/>

DNA Liquid Crystal Images at SMW Gallery

Giuliano Zanchetta from the University of Milan, and one of the authors of this months featured article, "Exploring Soft Matter With X-Rays", has submitted a stunning collection of DNA Liquid Crystal Images to the Soft Matter World Gallery. Whether a photograph, digital image from SEM work or a painting or drawing, we are always look-

ing for new and interesting images that say "soft matter science is art" to add to the gallery. Please send any submissions to editor. softmatterworld@gmail.com and visit the Gallery section for more information.

cience o editor. or more

<www.softmatterworld.org/gallery/>

We hope you enjoy browsing softmatterworld.org and come back soon

